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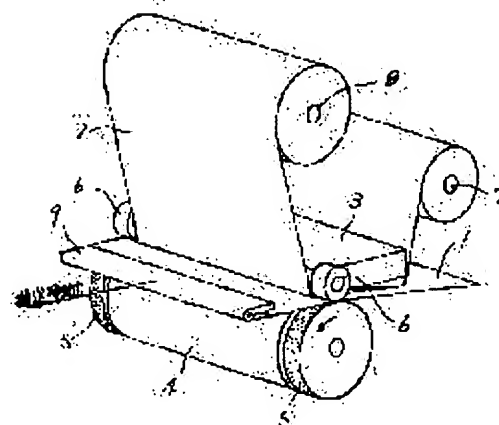
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(54) THERMAL TRANSFER RECORDING APPARATUS

(57)Abstract:

PURPOSE: To prevent generation of wrinkles on a recording paper in a thermal transfer recording apparatus, in which capstan rollers are provided coaxially on both outer ends of a platen roller.

CONSTITUTION: An ink sheet 2 and a recording paper 1 in a superposed position are pressed against a platen roller 4 by a thermal head 3 with the recording paper pressed against a pair of capstan rollers 5 by a pair of pinch rollers 6 provided coaxially on the both sides of the platen roller 4. The recording paper 1 is subjected to recording by the thermal head 3 while being conveyed by the pair of capstan rollers 5. The recording paper 1 is given a conveyance assisting force in a direction of conveyance by a clammer 9 so that a conveying force is substantially uniformly distributed over the recording paper 1 to prevent wrinkling of the recording paper 1.



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CLAIMS

[Claim(s)]

[Claim 1] Thermal-transfer-recording equipment characterized by providing the following A thermal head A platen roller which counters said thermal head through an ink sheet and the recording paper A capstan roller of a couple prepared in said platen roller and same axle in both sides of said platen roller It has a pinch roller of a couple which counters said each capstan roller through said recording paper. Pressing said ink sheet and said recording paper to said platen roller by said thermal head, pressing said recording paper to said capstan roller by said pinch roller, and conveying said recording paper with said capstan roller In thermal-transfer-recording equipment which gives heat to said ink sheet by said thermal head, and records on said recording paper An auxiliary driving means which arranges said capstan roller and said platen roller according to an individual pivotable, drives said platen roller, and gives conveyance auxiliary force of the recording paper conveyance direction to said recording paper

[Claim 2] Thermal-transfer-recording equipment according to claim 1 whose auxiliary driving means which drives a platen roller is the platen driving roller which gives reaction force to said platen roller to press to said platen roller of a thermal head.

[Claim 3] A thermal head and a platen roller which counters said thermal head through an ink sheet and the recording paper, A capstan roller of a couple prepared in said platen roller and same axle in both sides of said platen roller, It has a pinch roller of a couple which counters said each capstan roller through said recording paper. Pressing said ink sheet and said recording paper to said platen roller by said thermal head, pressing said recording paper to said capstan roller by said pinch roller, and conveying said recording paper with said capstan roller In thermal-transfer-recording equipment which gives heat to said ink sheet by said thermal head, and records on said recording paper Said capstan roller and said platen roller are arranged according to an individual pivotable. Thermal-transfer-recording equipment which established an auxiliary conveyance means to give conveyance auxiliary force of the recording paper conveyance direction to said recording paper, and said auxiliary conveyance means considered as a configuration which gives conveyance auxiliary force by at least one between capstan rollers of said couple about the conveyance direction in record space, and a direction which intersects perpendicularly.

[Claim 4] Thermal-transfer-recording equipment given in any of claims 1, 2, and 3 which made an outer diameter of a platen roller larger than an outer diameter of a capstan roller they are.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to thermal-transfer-recording equipment.

[0002]

[Description of the Prior Art] In recent years, although it is full color and the thermal-transfer-recording equipment which records an image has spread, want of high-definition-izing should wait quantity in it -- it gets down and a close-up of problems, such as a color gap, has been taken. In connection with this, the capstan pinch roller method is well used as a paper feed method with few color gaps. However, by this capstan pinch roller method, there is a problem that the recording start side margin of the recording paper is large. The method which forms a capstan roller on the same axle of a platen roller, pinches the margin portion of the recording paper side edge section by the capstan pinch roller as a method which solves this, and conveys the recording paper is indicated by JP,3-197159,A, JP,03-207684,A, and JP,63-193867,A.

[0003] An example of the above-mentioned conventional thermal-transfer-recording equipment is explained referring to a drawing below. Drawing 9 shows the perspective diagram of conventional thermal-transfer-recording equipment. In drawing 9, they are the thermal head which 103 applies heat from the ink sheet 102 side, and records on the recording paper 101, the platen roller which 104 countered the thermal head 103 through the recording paper 101 and the ink sheet 102, and was formed, the capstan roller of a couple with which 105 was prepared in a platen roller 104 and the same axle on both sides of a platen roller 104, and the pinch roller of the couple which 106 countered the capstan roller 105 through the recording paper 101, and was prepared. The ink sheet 102 is supplied from the supply reel 107, and is rolled round by the take up reel 108.

[0004] Actuation of each above-mentioned component is explained. First, the recording paper 101 is pinched by the capstan roller 105 of a couple, and the pinch roller 106 of a couple, and where the recording paper 101 and the ink sheet 102 are piled up, the recording paper 101 and the ink sheet 102 are pressed from the ink sheet 102 side to a platen roller 104 side by the thermal head 103. Then, it records by applying heat by the thermal head 103, rolling round the ink sheet 102 by the take up reel 108, conveying the recording paper 101 with a capstan roller 105.

[0005]

[Problem(s) to be Solved by the Invention] However, as the thermal-transfer-recording equipment of a configuration shows to drawing 10 conventionally [above], the frictional resistance of the ink sheet 102 and a thermal head 103 is the conveyance load R_h . It carries out, and the **** portion of the recording paper 101 is started, and it is the conveyance load R_h . The recording paper conveyance force F of the capstan roller 105 of hard flow is applied to the margin portion of the recording paper 101, and the moment M is working on the recording paper 101. Therefore, when there was not sufficient waist for the recording paper 101, the wrinkle arose on the recording paper 101 and it had the problem of leaving a big blemish to a record image.

[0006] This invention solves the above-mentioned problem and it aims at offering the thermal-transfer-recording equipment which a wrinkle arises on the recording paper and does not leave a big blemish to a record image.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned problem thermal-transfer-recording

equipment of this invention A thermal head and a platen roller which counters said thermal head through an ink sheet and the recording paper, A capstan roller of a couple with which said platen roller is not being engaged about a revolution although it is said platen roller and same axle in both sides of said platen roller, It has a pinch roller of a couple which counters said each capstan roller through said recording paper. It has an auxiliary conveyance means to give conveyance auxiliary force of the recording paper conveyance direction to said recording paper, and said auxiliary conveyance means is equipped with a configuration of giving conveyance auxiliary force by at least one between capstan rollers of said couple about the conveyance direction in record space, and a direction which intersects perpendicularly.

[0008]

[Function] The recording paper conveyance load which the conveyance auxiliary force given to at least one between the capstan rollers of said couple of the recording paper by the above-mentioned configuration produces by press of a thermal head is negated, and the recording paper conveyance force of a capstan roller in which this joins the recording paper becomes small, and it becomes possible to stop the formation of wrinkles also to the recording paper in which the moment produced on the recording paper in connection with this also becomes small, and no waist is.

[0009]

[Example] Hereafter, the example of this invention is explained, referring to a drawing. Drawing 1 shows the perspective diagram of the thermal-transfer-recording equipment in the 1st example of this invention. The thermal head 3 which records on the recording paper 1, applying heat to thermal-transfer-recording equipment from the ink sheet 2 side as shown in drawing 1, The platen roller 4 countered and formed in the thermal head 3 through the recording paper 1 and the ink sheet 2, The capstan roller 5 of the couple prepared in a platen roller 4 and the same axle on both sides of a platen roller 4, The pinch roller 6 of the couple which countered the capstan roller 5 and was prepared through the recording paper 1, It has the supply reel 7 which supplies the ink sheet 2, the take up reel 8 which rolls round the ink sheet 2, and the clamber 9, and the clamber 9 and the clamber migration device which is not illustrated are established as an auxiliary conveyance means. Here, the platen roller 4 is arranged according to the individual pivotable to the capstan roller 5. Moreover, a clamber 9 pinches the direction downstream of paper feed of the **** portion of the recording paper 1 at the time of record.

[0010] About the thermal-transfer-recording equipment constituted as mentioned above, the actuation is explained using drawing 1 below. First, the recording paper 1 is pinched by the capstan roller 5 of a couple, and the pinch roller 6 of a couple, and where the recording paper 1 and the ink sheet 2 are piled up, the recording paper 1 and the ink sheet 2 are pressed from the ink sheet 2 side to a platen roller 4 side by the thermal head 3. Then, the direction downstream of paper feed of the **** portion of the recording paper 1 is pinched by the clamber 9, and it conveys by the fixed force by the clamber migration device in which a clamber 9 is not illustrated. Thereby, it records by applying heat by the thermal head 3, conveying the recording paper 1 with a capstan roller 5, and rolling round the ink sheet 2 by the take up reel 8, giving the conveyance auxiliary force T of the direction of paper feed to the direction downstream of paper feed of the **** portion of the recording paper 1.

[0011] Drawing 2 shows distribution of the force produced on the recording paper under record in this thermal-transfer-recording equipment. It sets to drawing 2 and is Rh. The ink sheet 2, the conveyance load produced with the frictional resistance of a thermal head 3, and Re Rh by friction of a paper guide and the recording paper 1 etc. For the conveyance load of an except, the recording paper conveyance force of a capstan roller 5 in which F joins the recording paper 1, and T, the conveyance auxiliary force by the clamber 9 and M are the moment produced on the recording paper 1, and Lc. The width of face of one capstan roller, and Lh It is the length of a thermal head.

[0012] Hereafter, the distribution condition of the force produced on the recording paper 1 under record based on drawing 2 is explained. First, the frictional resistance of the ink sheet 2 and a thermal head 3 is the conveyance load Rh. It carries out, and the **** portion of the recording paper 1 is started, and it is the conveyance load Rh. The recording paper conveyance force F of the capstan roller 5 of hard flow is applied to the margin portion of the recording paper 1. Moreover, conveyance load Rh Conveyance load Re according to friction of the recording paper 1 etc. as the paper guide of an except The conveyance auxiliary force T is further

given to the **** portion of the recording paper 1 which is the recording paper 1 by the clamber 9 by being mostly distributed over full.

[0013] If a difference is in resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1 at this time, the moment M will arise in the recording paper 1. Since there was a difference of resultant force of the hit by the unit length shown in (several 1) when not applying the conveyance auxiliary force T to the **** portion of the recording paper 1, the moment M was produced on the boundary line of a **** portion and a margin portion, and it had become the cause of a wrinkle.

[0014]

[Equation 1]

$$\frac{F}{2 L_c} + \frac{R_h}{L_h}$$

[0015] However, since the clamber 9 has pulled the direction downstream of paper feed of the **** portion of the recording paper 1 by the conveyance auxiliary force T in the direction of paper feed here, it becomes small, the moment M produced on the recording paper 1 in connection with this becomes small, and the difference of resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1 can press down the formation of wrinkles. At this time, the moment M produced on the recording paper 1 will become min, if the conveyance auxiliary force T fulfills the conditions shown below.

[0016] If a difference is in resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1, the moment M will arise in the recording paper 1. Therefore, if resultant force (several 2) of the hit by the unit length which has joined the **** portion, and resultant force (several 3) of the hit by the unit length which has joined the margin portion become the same, and it fills so to speak (several 4), the moment M produced on the recording paper 1 will be set to M= 0.

[0017]

[Equation 2]

$$\frac{F}{2 L_c} + \frac{R_o}{2 L_c + L_h}$$

[0018]

[Equation 3]

$$\frac{T - R_h}{L_h} + \frac{R_o}{2 L_c + L_h}$$

[0019]

[Equation 4]

$$\frac{F}{2 L_c} + \frac{R_o}{2 L_c + L_h} = \frac{T - R_h}{L_h} + \frac{R_o}{2 L_c + L_h}$$

[0020] if balance of the force in the recording paper 1 is considered here -- F+T=Rh+Re it is -- since -- if it asks for T from these two formulas (several 5) -- it becomes. Therefore, if the conveyance auxiliary force T is set up so that it may be set to (several 5), distribution of the force will become homogeneity about a direction vertical to the direction of paper feed, and the moment M which joins the recording paper 1 will serve as min by M= 0.

[0021]

[Equation 5]

$$T = R_h + \frac{L_h}{2 L_c + L_h} \times R_o$$

[0022] Moreover, giving the conveyance auxiliary force T leads also to the improvement in color pile precision. Hereafter, color pile precision is explained using drawing 3 and drawing 4. Drawing 3 is drawing showing balance of the force under recording paper conveyance, and is Ra. The conveyance load Rh and Re The force and T which the sum total (Ra =Rh+Re) and F commit to the contact surface of a capstan roller 5 and the recording paper 1 are the conveyance auxiliary force.

[0023] $F=Ra-T$ will be filled if balance of the force is considered here. Moreover, drawing 4 is related drawing showing the relation between a conveyance load and the amount of color gaps, delta (Ra) sets the conveyance auxiliary force T to $T= 0$, and it is the sum total Ra of a conveyance load. The amount of color gaps which was changed, recorded and was measured, X is the maximum amount of color gaps permitted, and is F0. Conveyance load Ra at the time of being the maximum amount X of color gaps in which the amount delta of color gaps (Ra) is permitted $\Delta(F0) =X$ is filled. The sum total Ra of the conveyance load of equipment actual here It receives, and if the conveyance auxiliary force T is set up so that conditional-expression $F0 >|Ra-T|$ may be filled, it can fulfill a predetermined color pile precision.

[0024] Hereafter, the above-mentioned conditions are explained. If the conveyance auxiliary force T is enlarged, since the force F committed to the contact surface of a capstan roller 5 and the recording paper 1 will become small and slipping of a capstan roller 5 and the recording paper 1 will therefore become small from formula $F=Ra-T$ of balance of the force, it turns out that color pile precision improves. It is $F=Ra$ when the conveyance auxiliary force T is set to $T= 0$ here. It fills. therefore, the force F committed to the contact surface of a capstan roller 51 and the recording paper 1 when it is the maximum amount X of color gaps from which the amount delta of color gaps (Ra) is permitted by $T= 0$ (i.e., when filling $\Delta(F0) =X$) -- $F=F0$ it is -- F0 The hold force over the recording paper 1 of a capstan roller 51 will be shown (the following F0 is called the hold force). therefore, the force F committed to the contact surface of the recording paper 1 and a capstan roller 51 in order to make it smaller than the maximum amount X of color gaps which can permit the color gap delta (Ra) -- hold force F0 it does not exceed -- it is good to fill $F0 >|F|$ so to speak. Therefore, since balance of the force is $F=Ra-T$, if $F0 >|Ra-T|$ is filled, a predetermined color pile precision can be attained. Color pile precision improves, so that $|Ra-T|$ furthermore approaches 0, and a color gap will become min, if the conveyance auxiliary force T is set up so that $|Ra-T|=0$ may be filled especially.

[0025] Here, since the force F committed to the contact surface of the recording paper 1 and a capstan roller 5 is set to (several 6) from $F=Ra-T$ since the conveyance auxiliary force T is set up with (several 5), and it is small compared with the case where the conveyance auxiliary force T is not applied and slipping of a capstan roller 5 and the recording paper 1 is therefore small, color pile precision is improving.

[0026]

[Equation 6]

$$F = \frac{2 L_c}{2 L_c + L_n} \times R_c$$

[0027] In addition, it is the hold force F0 within limits which fill conditional-expression $F0 >|Ra-T|$ when conditional-expression $F0 >|Ra-T|$ is able to be enough filled with giving this conveyance auxiliary force T. Width of face of the concerned capstan roller 5, thrust of a pinch roller 6, etc. can be made small, and the tolerance of the layout to the miniaturization of equipment spreads. Moreover, narrowing width of face of a capstan roller 5 leads also to making magnitude of a crosswise margin small, and it can extend the area in which **** is possible.

[0028] While being able to improve color pile precision as mentioned above by giving the conveyance auxiliary force T at least to the direction downstream of paper feed of the **** portion of the recording paper 1 in the direction of paper feed by the clamper 9 which is an auxiliary conveyance means according to this example It is lost that a wrinkle arises, even when the difference of resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1 can be made small, the moment M produced on the recording paper 1 in connection with this can be made small and there is not sufficient waist for the recording paper 1 by this.

[0029] By this example, the platen roller 4 and capstan roller 5 which were formed on the same axle are

provided here so that it may not be engaged. When these platen rollers 4 and capstan rollers 5 are being engaged, the rotational speed of a platen roller 4 and a capstan roller 5 becomes the same, but since floating takes place on the rubber front face of the press portion to the platen roller 4 of a thermal head 1, even if a path is the same, the direction of a platen roller 4 will be conveyed with a platen roller 4 by the speed on a peripheral surface becoming quick, and positioning is more difficult for the recording paper 1 than a capstan roller 5. On the other hand, in the example of this invention, by having prepared according to the individual pivotable, the platen roller 4 of following to the recording paper 1 and being conveyed with a platen roller 4 can be lost, and can perform positioning of the recording paper 1 with a capstan roller 5, and a capstan roller 5 and a platen roller 4 can perform highly precise positioning.

[0030] In addition, although the press location to the capstan roller 5 of a pinch roller 6 is the same as the press location to the platen roller 4 of a thermal head 3, it may press a pinch roller 6 from it to a capstan roller 5 by the direction downstream of paper feed. [0031] Hereafter, it explains, referring to a drawing about the 2nd example of this invention. Drawing 5 shows the perspective diagram of the thermal-transfer-recording equipment in the 2nd example of this invention, gives a same sign to the thing of the 2nd example and this function, and the explanation is omitted.

[0032] For a platen roller and 12, as for a gear and 17, in drawing 5, a capstan roller, and 13-16 are [11 / a torque limiter and 18] driving sources. Here, the auxiliary driving means is constituted by gears 13-16, the torque limiter 17, and the driving source 18.

[0033] About the thermal-transfer-recording equipment of the above-mentioned component, the actuation is explained based on drawing 5. First, the recording paper 1 is pinched by the capstan roller 12 of a couple, and the pinch roller 6 of a couple, and where the recording paper 1 and the ink sheet 2 are piled up, the recording paper 1 and the ink sheet 2 are pressed from the ink sheet 2 side to a platen roller 11 side by the thermal head 3. Then, it records by applying heat by the thermal head 3, conveying the recording paper 1 with a capstan roller 12, and rolling round the ink sheet 2 by the take up reel 8, telling a platen roller 11 through the driving force of a driving source 18 in order of a gear 16, a gear 15, a torque limiter 17, a gear 14, and a gear 13, and giving the fixed conveyance auxiliary force T of the direction of paper feed to the recording paper 1.

[0034] Drawing 6 shows distribution of the force produced on the recording paper under record in this thermal-transfer-recording equipment. It sets to drawing 6 and they are Re, Rh, F, M and Lc, and Lh. The same force as drawing 2 etc. is shown, and T is conveyance auxiliary force given by the platen roller 11.

[0035] Hereafter, the distribution condition of the force produced on the recording paper 1 under record in the 2nd example based on drawing 6 is explained. First, the frictional resistance of the ink sheet 2 and a thermal head 3 is the conveyance load Rh. It carries out, and the **** portion of the recording paper 1 is started, and it is the conveyance load Rh. The recording paper conveyance force F of the capstan roller 12 of hard flow is applied to the margin portion of the recording paper 1. Moreover, conveyance load Rh Conveyance load Re according to friction of the recording paper 1 etc. as the paper guide of an except It is mostly distributed over full and the conveyance auxiliary force T is further given to the rear face of the recording paper 1 which is the **** portion of the recording paper 1 with the platen roller 11.

[0036] If a difference is in resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1 at this time, the moment M will arise in the recording paper 1. When the conveyance auxiliary force T was not applied to the **** portion of the recording paper 1, since the difference of resultant force of the hit by unit length was large, the big moment M was produced on the boundary line of a **** portion and a margin portion, and it had become the cause of a wrinkle.

[0037] However, since the platen roller 11 has given the conveyance auxiliary force T in the direction of paper feed with the rear face of the **** portion of the recording paper 1 here, it becomes small, the moment M produced on the recording paper 1 in connection with this becomes small, and the difference of resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1 can press down the formation of wrinkles. Moreover, in connection with applying this conveyance auxiliary force T, color pile precision as well as the 1st example improves. Here, if the conveyance auxiliary force T is set up like the 1st example, the moment M produced on the recording paper 1 will be made to min. Furthermore, since the platen roller 11 and capstan roller 12 which were formed on the same axle like the 1st example are formed according to the individual pivotable, a platen roller 11 follows to the recording paper 1, and being conveyed

with a platen roller 11 is lost, and with the capstan roller 12, the recording paper 1 can be positioned and is improving recording paper conveyance precision.

[0038] Moreover, since it has prepared so that the conveyance auxiliary force T may be given using a platen roller 11 in this example, the device for telling the conveyance auxiliary force specially is not needed, but the space for such a device becomes unnecessary, and small lightweight-ization of equipment can be attained. Moreover, since the pinching portion for giving the conveyance auxiliary force T by the direction downstream of paper feed becomes unnecessary at the recording paper 1, the margin of the record direction head can be made very small, and area in which **** in the recording paper 1 is possible can be made large.

[0039] Since the conveyance auxiliary force T is given to the recording paper 1 using the platen roller 11 above like according to this example Since the device for telling the special conveyance auxiliary force is not needed at the same time it prevents the formation of wrinkles of the recording paper 1, Since the pinching portion for being able to attain small lightweight-ization of equipment and giving the conveyance auxiliary force becomes unnecessary at the recording paper 1, the margin of the record direction head can be made very small, and area in which **** in the recording paper 1 is possible can be made large.

[0040] In addition, although the press location to the capstan roller 12 of a pinch roller 6 is the same as the press location to the platen roller 11 of a thermal head 3, it may press a pinch roller 6 from it to a capstan roller 12 side by the direction downstream of paper feed.

[0041] Hereafter, it explains, referring to a drawing about the 3rd example of this invention. Drawing 7 shows the perspective diagram of the thermal-transfer-recording equipment in the 3rd example of this invention, gives a same sign to the thing of the 2nd example and this function, and the explanation is omitted. In drawing 7, 21 is a platen driving roller which is the component of an auxiliary driving means with which a platen roller and 22 drive a capstan roller and 23 drives a platen roller 21. Here, the auxiliary driving means is constituted by gears 15 and 16, the torque limiter 17, the driving source 18, and the platen driving roller 23.

[0042] Moreover, it is the spring with which the arm on which 24 supports the platen driving roller 23, and 25 press the platen driving roller 23 to the rocking lever shaft of an arm 24, and 26 presses it to a platen roller 21.

[0043] About the thermal-transfer-recording equipment of the above-mentioned component, the actuation is explained based on drawing 7. First, the recording paper 1 is pinched by the capstan roller 22 of a couple, and the pinch roller 6 of a couple, and where the recording paper 1 and the ink sheet 2 are piled up, the recording paper 1 and the ink sheet 2 are pressed from the ink sheet 2 side to a platen roller 21 by the thermal head 3.

Then, it records by applying heat by the thermal head 3, conveying the recording paper 1 with a capstan roller 22, and rolling round the ink sheet 2 by the take up reel 8, telling the driving force of a driving source 18 to a platen roller 21 through a gear 16, a gear 15, a torque limiter 17, and the platen driving roller 23, and giving the fixed conveyance auxiliary force T of the direction of paper feed to the recording paper 1.

[0044] At this time, distribution of the force produced on the recording paper under record in the 3rd example of this invention is the same as the 2nd example, and is the same as that of what is shown in drawing 6. Therefore, since the platen roller 21 has given the conveyance auxiliary force T in the direction of paper feed with the rear face of the **** portion of the recording paper 1 like the 2nd example, it becomes small, the moment M produced on the recording paper 1 in connection with this becomes small, and the difference of resultant force of the hit by the unit length which has joined the **** portion and margin portion of the recording paper 1 can press down the formation of wrinkles. Moreover, in connection with applying the conveyance auxiliary force T, color pile precision as well as the 1st example improves. If the conveyance auxiliary force T is set up like the 1st example here, the moment M produced on the recording paper 1 will be made to min. Furthermore, since the platen roller 21 and capstan roller 22 which were formed on the same axle like the 1st example are formed according to the individual pivotable, a platen roller 21 follows to the recording paper 1, being conveyed of it with a platen roller 21 is lost, and it can position the recording paper 1 with a capstan roller 22, and is improving recording paper conveyance precision.

[0045] Moreover, in this example, the hauling force of a spring 26 was given to the platen driving roller 23 through the arm 24 which uses a rocking lever shaft 25 as the supporting point, and the reaction force over the press to the platen roller 21 of a thermal head 3 is given to the platen roller 21. If thrust to the platen roller 21 of the platen driving roller 23 is made the same as the thrust to the platen roller 21 of a thermal head 3 here, even if a platen roller 21 makes a path small, it does not bend, and can make the path of a platen roller 21 thin.

[0046] While driving a platen roller 21 with the platen driving roller 23, giving the conveyance auxiliary force T to the recording paper 1 and preventing the formation of wrinkles of the recording paper 1 according to this example as mentioned above, since the reaction force over the press to the platen roller 21 of a thermal head 3 is given to the platen roller 21 with this platen driving roller 23, the path of a platen roller 21 can be made thin, and small lightweight-ization of equipment can be attained.

[0047] Here, if reaction force can be given so that a platen roller 21 may not bend, the platen driving roller 23 may use two or more, and even if it does not press full [of a platen roller 21], it will not care about the length of shaft orientations.

[0048] In addition, although the press location to the capstan roller 22 of a pinch roller 6 is the same as the press location to the platen roller 21 of a thermal head 3, it may press a pinch roller 6 from it to a capstan roller 22 side by the direction downstream of paper feed.

[0049] Hereafter, it explains, referring to a drawing about the 4th example of this invention. (b) of the side elevation in the thermal-transfer-recording equipment in the 4th example of this invention and drawing 8 is the important section amplification side elevation of the part enclosed with the dotted line of (a) of drawing 8, gives a same sign to the thing of the 1st example and this function, and (a) of drawing 8 omits the explanation.

[0050] In (a) of drawing 8, and (b), 31 is the platen roller of outer-diameter $d_p = 22.5(\text{mm})$, and 32 is the capstan roller of outer-diameter $d_c = 22(\text{mm})$. The capstan roller 32 is made of the rigid body which distributed the minute projection of the projection height 10 [about] (μm) over the front face, and is the capstan roller outer diameter d_c . It considers as the diameter of the outermost containing surface projection height. In addition, the configuration and actuation of this example are the same as that of the 1st example of this invention shown by drawing 1 except for the above-mentioned platen roller 31 and the above-mentioned capstan roller 32. The detailed conditioning of this example is shown in (a table 1).

[0051]

[A table 1]

キャプスタンローラ外径 d_c	22	(mm)
プラテンローラ外径 d_p	22.5	(mm)
サーマルヘッド押圧力 P	6	(kg)
サーマルヘッド長さ L	190	(mm)
グレース曲率 R	10	(mm)
ポアソン数 m	2	
プラテングム縦弾性係数 E	0.34	(kg/mm^2) (硬度60°)

[0052] By the above-mentioned configuration, it sets to this example, and is the outer diameter d_p of a platen roller 31. Outer diameter d_c of a capstan roller 32 $d_p > d_c$ When the pressure welding of the thermal head 3 is carried out to the front face of the recording paper 1 at the time of record as shown in drawing 8 since it has set up so that it may fill, the front face of the recording paper 1 cannot touch with edge 3a of a thermal head 3, and deterioration of the image grace by generating of a blemish can be prevented.

[0053] in addition, highly [the thrust of a thermal head 3], although the amount of crushing of the platen roller 31 by press of a thermal head 3 was so small that it could be disregarded with 54 (μm) in this example, when a platen rubber degree of hardness is small, it leads from the formula of a Hertz -- having (several 7) -- the amount y of crushing expressed must be taken into consideration. m is thrust [as opposed to / as opposed to / in the Poisson's number and E / the modulus of direct elasticity of a platen roller 31 / the platen roller 31 of a thermal head 3 in P] here, L is the length of a thermal head 3, and R is the curvature of the glaze of the exoergic section of a thermal head 3.

[0054]

[Equation 7]

$$y = \frac{d_p}{2} - \left(\frac{d_p^3}{4} - \frac{2}{\pi} \times \frac{m^2 - 1}{m^2 \times E} \times \frac{P}{L} \times \frac{d_p \times 2R}{d_p + 2R} \right)^{1/2}$$

$$+ R - \left(R^3 - \frac{2}{\pi} \times \frac{m^2 - 1}{m^2 \times E} \times \frac{P}{L} \times \frac{d_p \times 2R}{d_p + 2R} \right)^{1/2}$$

[0055] When the $P=15(\text{kg})$ platen rubber modulus of direct elasticity E is computed using (several 7), it is large and it becomes impossible to disregard it with $0.25 (\text{mm})$, when thrust P of a thermal head 3 is set to $E=0.15 (\text{kg/mm}^2)$ (degree of hardness of 40 degrees) in the above-mentioned example as an example. When such, the amount y of crushing of this platen roller 31 is taken into consideration, and they are the outer diameter d_p of a platen roller, and the capstan roller outer diameter d_c . It receives, and if it sets up so that $d_p > d_c + y \times 2$ may be filled, the front face of the recording paper 1 cannot be touched with edge 3a of a thermal head 3, and deterioration of the image grace by generating of a blemish can be prevented.

[0056] In addition, although the press location to the capstan roller 32 of a pinch roller 6 is the same as the press location to the platen roller 31 of a thermal head 3, it may press a pinch roller 6 from it to a capstan roller 32 by the direction downstream of paper feed.

[0057]

[Effect of the Invention] The platen roller which counters a thermal head and said thermal head through an ink sheet and the recording paper as mentioned above according to this invention, The capstan roller of the couple prepared in said platen roller and same axle in the both sides of said platen roller, It has the pinch roller of the couple which counters said each capstan roller through said recording paper. In the thermal-transfer-recording equipment which records by said thermal head, conveying said recording paper by said capstan roller and said pinch roller Said capstan roller and said platen roller are not made engaged about a revolution. An auxiliary conveyance means to give the conveyance auxiliary force of the recording paper conveyance direction to said recording paper is established. The formation of wrinkles can be prevented without adding the moment with said recording paper impossible for, when said auxiliary conveyance means gives the conveyance auxiliary force by at least one between the capstan rollers of said couple about the conveyance direction in record space, and the direction which intersects perpendicularly.

[0058] Moreover, by making the outer diameter of a platen roller larger than the outer diameter of a capstan roller, it is lost that the edge of a thermal head touches on the surface of the recording paper, and deterioration of the image grace by generating of a blemish can be prevented.

[Translation done.]

* NOTICES *

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective diagram of the thermal-transfer-recording equipment in the 1st example of this invention.

[Drawing 2] It is drawing showing distribution of the force produced on the recording paper under record of this thermal-transfer-recording equipment.

[Drawing 3] It is drawing showing balance of the force under recording paper conveyance of this thermal-transfer-recording equipment.

[Drawing 4] It is drawing showing the conveyance load of this thermal-transfer-recording equipment, and the relation of the amount of color gaps.

[Drawing 5] It is the perspective diagram of the thermal-transfer-recording equipment in the 2nd example of this invention.

[Drawing 6] It is drawing showing distribution of the force produced on the recording paper under record of this thermal-transfer-recording equipment.

[Drawing 7] It is the perspective diagram of the thermal-transfer-recording equipment in the 3rd example of this invention.

[Drawing 8] The side elevation of thermal-transfer-recording equipment [in / in (a) / the 4th example of this invention] and (b) are the important section enlarged view.

[Drawing 9] It is the perspective diagram of conventional thermal-transfer-recording equipment.

[Drawing 10] It is drawing showing distribution of the force produced on the recording paper under record in conventional thermal-transfer-recording equipment.

[Description of Notations]

- 1 Recording Paper
- 2 Ink Sheet
- 3 Thermal Head
- 3a Edge
- 4, 11, 21, 31 Platen roller
- 5, 12, 22, 32 Capstan roller
- 6 Pinch Roller
- 7 Supply Reel
- 8 Take Up Reel
- 9 Clamper
- 13-16 Gear
- 17 Torque Limiter
- 18 Driving Source
- 23 Platen Driving Roller
- T Conveyance auxiliary force

[Translation done.]

13

【図6】同熱転写記録装置の記録中の記録紙に生じる力の分布を示す図である。

【図7】本発明の第3の実施例における熱転写記録装置の斜視図である。

【図8】(a)は本発明の第4の実施例における熱転写記録装置の側面図、(b)はその要部拡大図である。

【図9】従来の熱転写記録装置の斜視図である。

【図10】従来の熱転写記録装置における記録中の記録紙に生じる力の分布を示す図である。

【符号の説明】

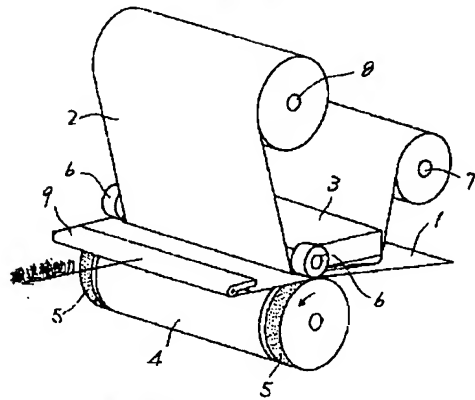
- | | |
|---|---------|
| 1 | 記録紙 |
| 2 | インクシート |
| 3 | サーマルヘッド |

- | | |
|---------------|--|
| 3 a | |
| 4, 11, 21, 31 | |
| 5, 12, 22, 32 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 13~16 | |
| 17 | |
| 10 18 | |
| 23 | |
| T | |

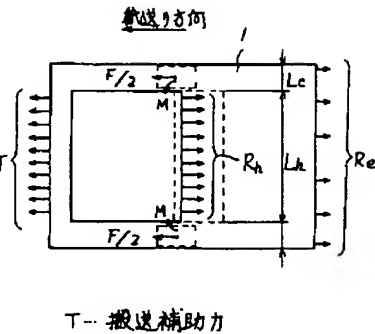
14

- | |
|-----------|
| エッジ |
| プラテンローラ |
| キャプスタンローラ |
| ピンチローラ |
| 供給リール |
| 巻き取りリール |
| クランパ |
| ギヤ |
| トルクリミッタ |
| 駆動源 |
| プラテン駆動ローラ |
| 搬送補助力 |

【図1】

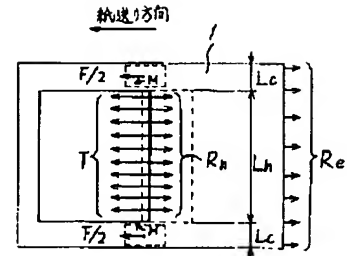


【図2】

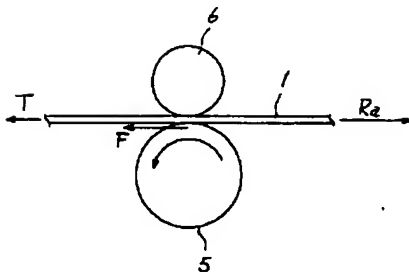


- | |
|----------------|
| 1... 記録紙 |
| 2... インクシート |
| 3... サーマルヘッド |
| 4... プラテンローラ |
| 5... キャプスタンローラ |
| 6... ピンチローラ |
| 7... 供給リール |
| 8... 巻取りリール |
| 9... クランパ |

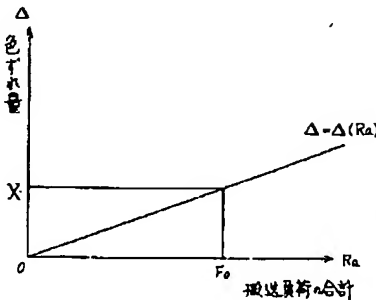
【図6】



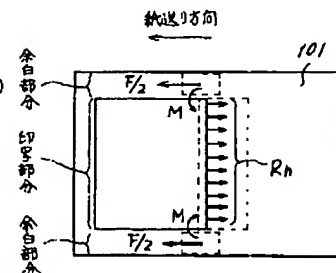
【図3】



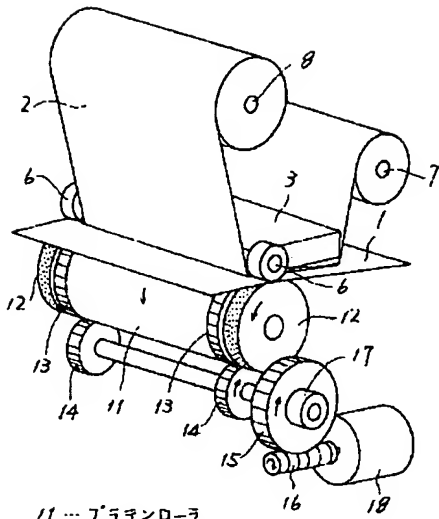
【図4】



【図10】

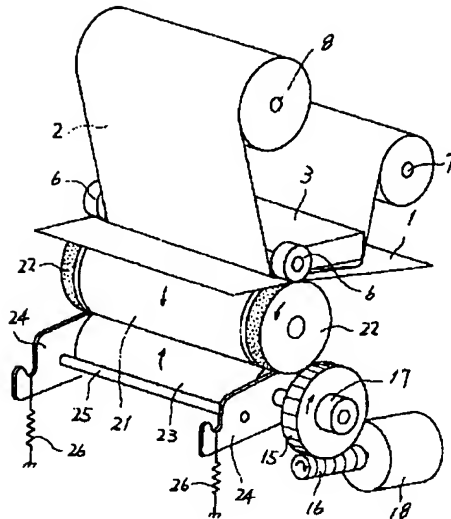


【図5】



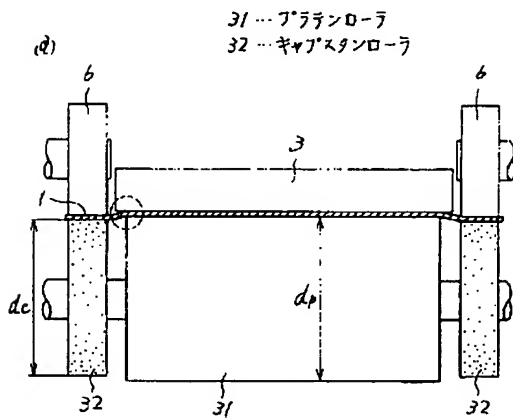
- 11 ... プラテンローラ
12 ... ギャブスタンローラ
13-16 ... ギヤ
17 ... トルクリミッタ
18 ... 駆動源

【図7】

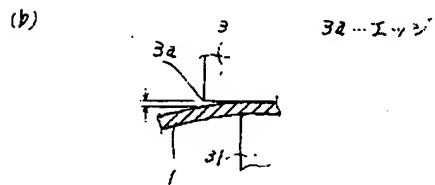


- 21 ... プラテンローラ
22 ... ギャブスタンローラ
23 ... プラテン駆動ローラ

【図8】



- 31 ... プラテンローラ
32 ... ギャブスタンローラ



【図9】

